Cement MILL SECTION of

Concrete

Vol. 22 JANUARY, 1923 No. 1

Missouri Company Erects New Silo Storage Plant

The Missouri Portland Cement Co. is converting its Prospect Hill plant from a dry process to a wet process plant, and at the same time increasing the capacity and adding new structures, one of which is a battery of eight silo storage bins. A new kiln building, with kilns and the necessary equipment, is also being added to the plant.

The eight circular reinforced concrete storage tanks are 40 ft. in diameter and 70 ft. high. They are arranged in two groups of four each. These tanks rest on a heavy concrete foundation, supported on reinforced concrete piles. They are surmounted by a reinforced concrete monitor, running lengthwise of each group, which connects with the packing house structure between the two groups of silos.

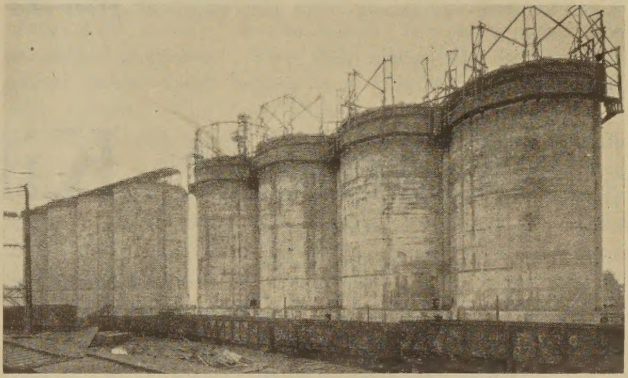
Cement from the adjoining mill is carried by an inclined belt conveyor bridge to the top of the packing house, where it is discharged onto horizontal belt conveyors in the monitors. From the belt conveyor, which conveys the cement from the finishing mill, it is distributed in the tanks by a shuttle belt conveyor, discharging into the silos, from which it is drawn off as needed through openings in the silo bottoms.

Smidth exbiners will be used for taking the cement out of the tanks and screw conveyors will carry it to the elevators, which will deposit it in bins over the Bates packers.

In the packing house, the cement is sacked and shipped as needed.

Smidth exbiners, a typical installation of which is shown in Fig. 3, are located in the tunnel under the silos, and inverted conveyor troughs cover the screw conveyor. Cast iron covers are fitted to the conveyor cover at points opposite to each one of the discharge openings in the bottom of the silos. Discharge outlet castings are set in the bottom of the silos and provided with a gate operated by racks and pinions by means of ratchets.

In use, the exbiner is adjusted to an exact and tight fit with the face of the discharge castings, the motor started and the gate gradually opened. The screw in the exbiner is so constructed as to quickly check any possible rush of cement with the opening of the gate. Sufficient space is provided over the conveyor to prevent an overflow of cement at this point.



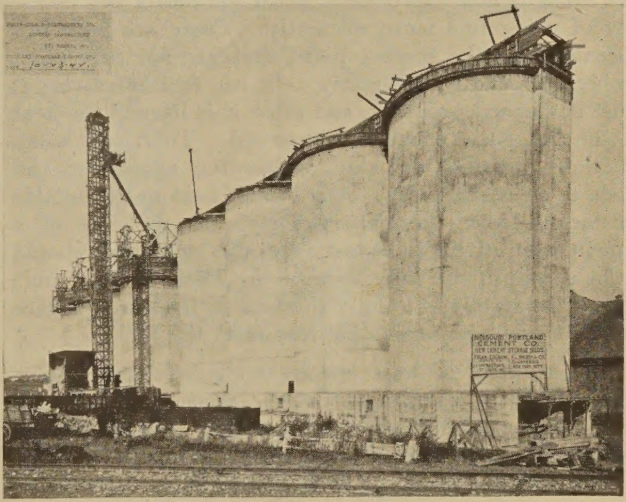


Fig. 1—Silo Storage Bins of Missouri Portland Cement Co., Under Construction—Steel Structure on Left Is Part of the Conveyor System Connecting with the Finishing Department

Fig. 2—View of Silo Bins, Showing Mixer and Material Storage Layout

As shown in the illustration, the silos were constructed with movable wooden forms, each group of four being constructed independently. The forms were raised by screw jacks acting on jack rods. The weight of the forms, the working platform inside the silos, the finishing platform on the outside, as well as on the inside of the forms were all supported, as shown, from steel

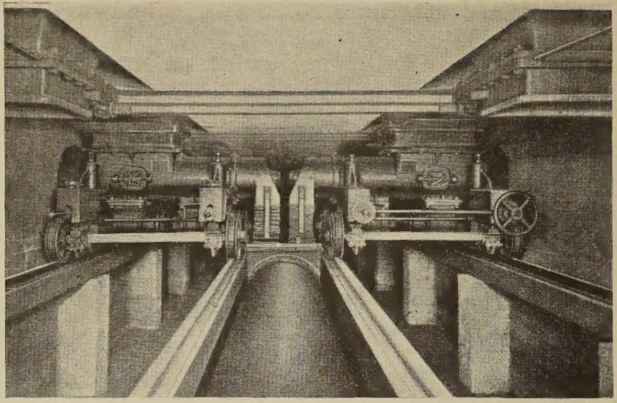


FIG. 3—TYPICAL SMIDTH EXBINER INSTALLATION

yokes, which were supported on the jacks.

Each group of four silos was constructed in approximately one week, working three shifts of eight hours each, continually. This meant an average lift of about 10 ft. in 24 hours.

PLANT LAYOUT

Cement was furnished from the adjacent plant and other material was delivered by rail over the track shown in the illustration. Material was unloaded by a derrick with a clam shell bucket, and stored in an assembled steel bin with hopper bottom. A mixer with hoisting tower was located below the bins, and the concrete from the mixer was hoisted to a point on the deck and then distributed by means of buggies.

The bins were constructed in units of four, and the forms were moved on the job according to schedule. The placing of the reinforcing and the concreting were also carried out according to schedule.

As the forms were raised the spiral reinforcing was continued up to the desired point, and the necessary vertical rods put in place. Concrete was delivered to the forms in buggies, this work being so timed that the forms were filled evenly to the top by the time the next lift period arrived.

The engineers in charge of the improvements at the Missouri company's plant are F. L. Smidth Co., New York City, and construction work on the silo storage plant was done by the Fruin-Colnon Contracting Co., St. Louis, Mo., of which A. P. Greensfelder, to whom we are largely indebted for the above information, is secretary.

Cement Kiln Insulation

BY PAUL C. DURBIN

ENGINEER, CELITE PRODUCTS CO.

The recent coal strike and resulting fuel shortage has brought home to cement plant operators the necessity of using fuel more efficiently. There are very few operations in the cement plant that are not dependent on heat directly or indirectly. To use fuel effectively it must be burned properly, and after it is burned the heat in the hot gases must be conserved. This heat must, wherever possible, be kept within the apparatus and made to do useful work. Any loss of heat to the outside air means lower thermal efficiency. In the case of a cement kiln all the heat lost from the steel shell should be held within the kiln to burn the clinker. One purpose of insulation is to hold the heat in the kiln to reduce the radiation and convection loss from the shell.

The quantity of heat lost by an uninsulated kiln is seldom realized by kiln operators. Since such information is of special interest to all operators, below is shown comparative loss from an uninsulated kiln and the saving in fuel to be expected by insulation of the same kiln. In each case the lining is the same thickness, so no decrease in the capacity of the kiln results from insulation. On the contrary, an increased output may be had by burning the same amount of fuel.

Assume that the kiln in the first case is lined with 9 in. of first quality firebrick, and in the second with 6½ in. of first quality firebrick and 2½ in. of Sil-O-Cel insulating brick. Since insulation is omitted in the hot zone, for calculating purposes 1,800° F. will be used as the internal temperature. In the following formulas a radiation-convection loss factor of 4 is used. The factor ordinarily used for still air is 2, but due to rotation of the kiln and ventilation this factor will be at least twice as high in kiln sheds as in still air, and possibly 3 or 4 times as high. The formula used to calculate the heat loss in each case is the following:

$$H = \frac{1}{\frac{1}{K}+\frac{d}{c}+\frac{d}{c}+\frac{1}{K}} + (t_1—t_2)$$

H=Heat loss in B. T. U. per sq. ft. per hr.
K=Radiation-Convection Factor
d=Thickness of 1st Component (Firebrick)
d_1=Thickness of 2nd Component (Insulating brick).
c=Conductivity of 1st Component (Firebrick)
c_1=Conductivity of 2nd Component (Insulating brick)
t_1=Inside Temperature.
t_2=Outside Air Temperature.

VALUES USED IN CALCULATION

	Uninsulated Kiln	Insulated Kiln
Factor K	4	4
Conductivity of firebrick	8.5 (1000° F.)	10.0 (1350° F.)[1]
Conductivity of Sil-O-Cel insulating brick		0.7 (800° F.)[2]
Thickness of firebrick	9″	6.5″
Thickness of Sil-O-Cel insulating brick		2.5″
Inside kiln temperature	1800°	1800°
Outside air temperature	100°	100°

[1] B. Dudley, Jr., *Trans-American Electro Chemical Society*, 1915.
[2] Celite Products Co.

Case I—Uninsulated (Sec. A)

$$H = \frac{1}{\frac{1}{4}+\frac{9}{8.5}+\frac{1}{4}} \times (1800—100) = \frac{1700}{1.50} = 1090 \text{ B.T.U.}$$

per sq. ft. per hr.

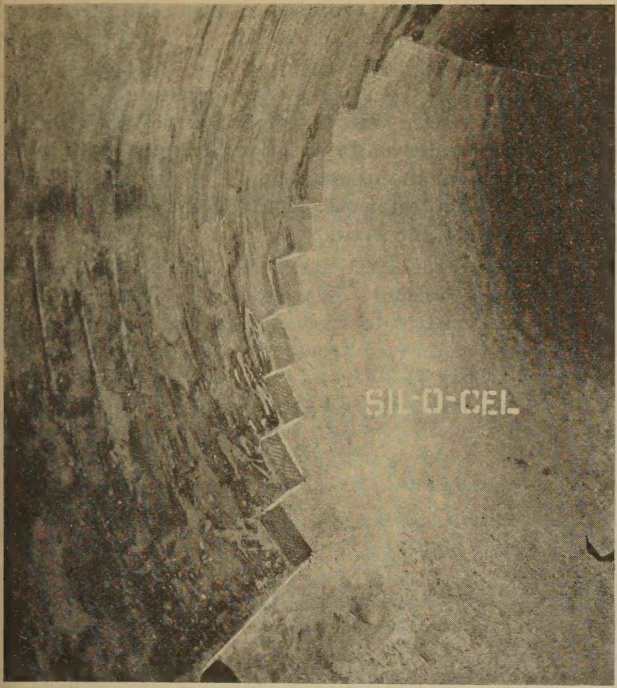


FIG. 1—METHOD OF INSULATING ROTARY KILN WITH SIL-O-CEL

Case II—Insulated (Sec. B)

$$H=\frac{1}{\frac{1}{4}+\frac{6.5}{10.0}+\frac{2.5}{.7}+\frac{1}{4}}\times(1800-100)=\frac{1700}{4.72}=360$$

B.T.U. per sq. ft. per hr.

1090—360=730 B.T.U. per sq. ft. per hr. Saved by insulation, = 67%.

To see the dollars and cents value of this saving on a particular kiln, assume that 140 ft. of a 10 ft. by 200 ft. kiln is insulated with 2½ in. of Sil-O-Cel insulating brick. The surface thus insulated will have an area of 4,396 sq. ft. This area, multiplied by the saving of 730 B.T.U. per sq. ft., and divided by 12,000 (B.T.U. per lb. coal), gives a saving of 267 lbs. per hour. Assuming the kiln operates 24 hours a day and 300 days a year, and the same number of barrels of cement is burned, this saving amounts to 956 tons per year. With definite knowledge of the price of fuel as fired, this tonnage may be readily converted into dollars and cents. Using a figure as low as $3.00 per ton, the saving amounts to $2,868.00 per year. The first year's saving alone will more than pay for the cost of the insulation. Each succeeding year will give a clear saving of a like amount.

This cash saving is only one of the advantages obtained by insulation. A cooler kiln shed is automatically insured because the heat is kept within the kiln. This more comfortable working condition for the men tends to increase their efficiency. The comfort of the employee is also reflected in the lower labor turnover.

Since the shell of an insulated kiln is at a lower temperature, it has less tendency to warp, and the rollers, bearings and motors are cooler and more easily lubricated.

The life of the refractory is increased by insulation because it is held at a more uniform temperature. The loss due to spalling is reduced. Furthermore, the clinkering zone temperature of an insulated kiln will be as low or lower than that of an uninsulated kiln, provided the same mean operating temperature is maintained throughout the kiln. This may not be clear until the passage of the material through the kiln is followed. Starting at the upper end of the kiln, the free moisture is first driven off; next the combined moisture, and next the CO_2. Further down the kiln, where the temperatures are higher, the lime and free silica combine to form lower silicates. In the hot zone these lower silicates fuse and more lime goes into solution until finally the basic silicates and aluminates crystallize out, forming the clinker. In the hot zone the temperature must be sufficiently high to cause the final reaction. In an uninsulated kiln the temperature in the clinkering zone must be higher than necessary, so enough heat is left in the gases to prepare the materials for final burning, and to supply the heat radiated from the shell. In the insulated kiln the clinkering zone temperature need only be high enough to complete the reaction, for, with the heat saved by insulation, there is sufficient heat present to prepare the materials for this final burning.

Among the other advantages secured by kiln insulation are the following: A more uniform distribution of heat, minimizing local overheating, more accurate and easier temperature control, and conservation of more of the unused portion of heat for power production or other purposes. This last advantage is important where waste heat boilers are installed in connection with a kiln. The flues that conduct the hot gases to the waste heat boilers should also be insulated to make the whole installation efficient. The waste gases from a cement kiln are at such a high temperature that the modern plants make use of them for steam generation. The kiln should be insulated regardless of whether a waste heat plant is to be installed at the same time or not; not only to secure the advantages outlined above,

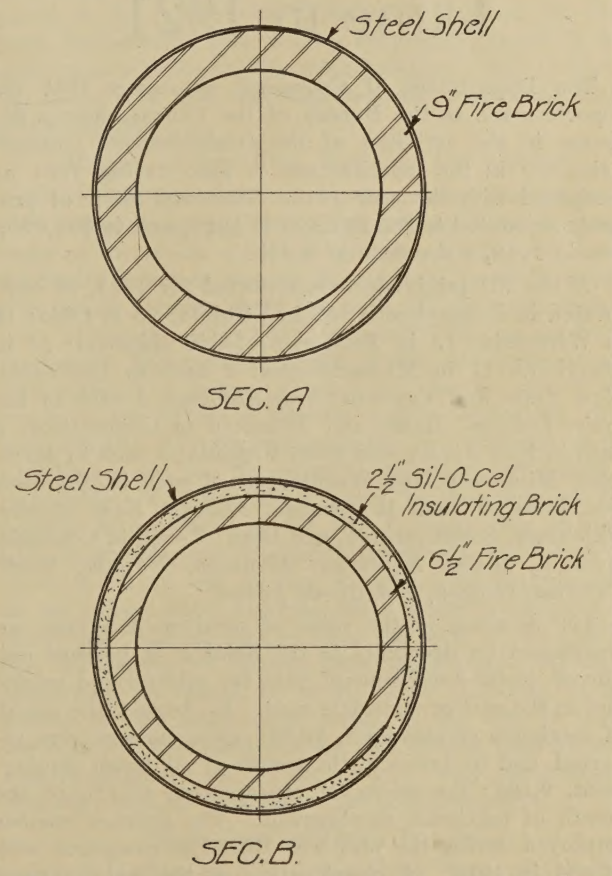


FIG. 2—SECTIONAL DIAGRAM SHOWING CEMENT KILN INSULATION

but also to cut down the cost if a waste heat system will be installed at a later date.

Selection of Insulation

Care must be taken in the selection of the material to be used to insulate a cement kiln, because the operating conditions are severe. The material should have high insulating value and be sufficiently refractory so that it will not fuse when placed in direct contact with the highly heated firebrick. At the same time it should possess sufficient mechanical strength to carry the loads imposed upon it. It should be light in weight and be able to withstand high temperatures without decomposing or changing greatly in volume. Furthermore, it should be of convenient form, readily applied and reasonable in cost. The material should be of such composition as not to react upon or attack the kiln shell, even in the presence of moisture, viz., it should contain no free acid radicals. It should not be broken or caused to settle by vibration or heat.

Recapitulation

The advantages to be gained by the use of an efficient insulating material in a cement kiln are, therefore:

1. A marked saving of fuel.
2. Better working conditions.
3. Longer life of shell and auxiliary equipment.
4. Longer life of refractories.
5. More uniform distribution of heat.
6. Ease of temperature control.
7. Conservation of unused heat for power production.

Lime in 1921

The Department of Commerce announces that the reports made to the Bureau of the Census show a decrease in the activities of the establishments engaged primarily in the manufacture of lime during 1921 as compared with the year 1919. The total value of products amounted to $30,977,500 in 1921, and to $33,970,500 in 1919, a decrease of 8.8%.

Of the 301 establishments reported for 1921, 59 were located in Pennsylvania; 30 in Virginia; 23 in Ohio; 18 in Wisconsin; 15 in Tennessee; 14 in Missouri; 13 in Maryland. 11 in Massachusetts; 9 each in California, New York, and Vermont; 8 in Alabama, 7 each in Illinois, Indiana, Maine and Texas; 6 in Connecticut; 5 each in New Jersey and West Virginia; 4 each in Michigan, Minnesota, and Washington; 3 each in Arkansas and Iowa; 2 each in Arizona, Florida, New Mexico, Oklahoma, South Dakota, and Utah; 1 each in Colorado, Georgia, Idaho, Kentucky, Montana, Nevada, North Carolina, Oregon, and Rhode Island.

The decrease in the value of products has been accompanied by decreases in the number of persons employed, in the total amount paid for salaries and wages, and in the cost of materials used. In August, the month of maximum employment, 10,926 wage earners were reported, and in January, the month of minimum employment, 9,108; the minimum representing 83.4% of the month of maximum employment. The average number employed during the year was 10,335 as compared with 11,405 in 1919. A classification of the wage earners with reference to the prevailing hours of labor in the establishments in which employed shows that for 3,750, or 36.3% of the total (average) number, the prevailing hours per week were 60; for 2,864, or 27.7%, the prevailing hours per week were 54; and for 1,262 or 12.2%, the prevailing hours per week were between 54 and 60. Only 324, or 3.1% were employed in establishments where the prevailing hours of labor per week were more than 60. while on the other hand 2,135 or 20.7% were employed in establishments where the prevailing hours were less than 54 per week.

The statistics for 1921 and 1919 are summarized in the following statement. The figures for 1921 are preliminary, and subject to such change and correction as may be found necessary from a further examination of the original reports.

STATISTICS FOR 1921 AND 1919

	1921*a*	1919*a*	Per Cent of Decrease
Number of establishments......	301	476	36.7
Persons engaged	11,248	12,855	12.5
Proprietors or firm members.	99	349	71.6
Salaried employees	814	1,101	26.1
Wage earners (average number)	10,335	11,405	9.4
Salaries and wages............	$11,745,500	$12,865,100	8.7
Salaries	1,958,000	1,995,900	1.9
Wages	9,787,500	10,869,200	10.0
Paid for contract work........	102,000	70,400	44.9*b*
Cost of materials	14,195,400	14,296,900	0.7
Value of products	30,977,500	33,970,500	8.8
Value added by manufacture..	16,782,100	19,673,600	14.7

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a Figures for 1921 do not include establishments reporting products under $5,000, viz., 92 establishments with 109 wage earners and products amounting to $236,100; whereas the figures for 1919 include 149 establishments with products under $5,000, reporting 141 wage earners and products valued at $292,900.

b Increase.

Statistics of quantity production for the years 1921 and 1919, as reported by the U. S. Geological Survey, are given in the following table. The figures relate to lime burned and *sold* and to hydrated lime manufactured and *sold* in the United States by all establishments regardless of their size and the character of their chief products.

STATISTICS OF QUANTITY PRODUCTION

	1921	1919	Per Cent of Decrease
Hydrated lime	792,970	777,408	*2.0
Lime (quicklime)	2,532,153	3,330,347	24.0

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*Increase.

Duty on Canadian Cement Protested

The Customs Service of the Treasury Department has announced that an American producer has notified the Department that he desires to protest the rate of duty assessed by the Customs Service on Canadian cement, because that assessment does not include the rate of 20% ad valorem on the bags in which the cement is imported. In notifying customs collectors how to proceed in this matter, the Customs Service stated:

"Entries of such cement which have been liquidated with the assessment of 20% ad valorem on the bags shall be reliquidated without the assessment of such duty, but no refund made, and the particulars of the entries with the dates of liquidation and reliquidation reported to the Department as soon as practicable.

"The particulars of entries of such cement liquidated without the assessment of the 20% ad valorem on the bags and the dates of liquidation should be reported promptly to the Department."

Stripping Problems in Limestone Quarries of Shenandoah Valley[1]

By Oliver Bowles

Mineral Technologist, U. S. Bureau of Mines

The United State Bureau of Mines has recently undertaken a study of limestone quarrying for lime manufacture, in connection with which a series of short papers on various phases of the industry will be issued. The present report is the first of this series.

The purpose of these reports is to discuss conditions, methods, and equipment, in order to promote high efficiency and safety in the operation of the quarries. It is highly desirable that quarry operators and superintendents study these reports carefully, and supply the Bureau of Mines with any criticisms or suggestions that may assist in a proper solution of the problem. The bureau's representative has observed many quarries in widely separated localities, but undoubtedly a more comprehensive and helpful final report can be prepared if his observations are supplemented by suggestions from practical men who are actively employed in quarry work. It is urgently requested therefore that any reader of this report who has had experience in quarrying will write to the bureau, giving any constructive criticisms, changes or corrections that may suggest themselves to him.

Solution Cavities

The limestones of the Shenandoah Valley of Virginia and West Virginia are characterized by numerous solution cavities brought about by surface or subterranean stream erosion. Some form extensive caverns, in which part of the dissolved calcium carbonate (limestone) has been redeposited as stalactites and various other ornate forms. Some of the caverns have been illuminated and opened to the public as commercial enterprises. In a few instances the cavities constitute a commercial asset in the Valley, yet from the quarryman's point of view they are a decided disadvantage, for they constitute one of his hardest problems.

Clay Seams and Pockets

The quarryman's difficulty is due to the occurrence, even at considerable depth, of erosion cavities, not in the form of open spaces, but filled with red clay. These clay masses are troublesome, and their removal is costly. The problem is of general interest to all limestone quarrymen, for erosion cavities are characteristic of limestone deposits though they are not generally developed as much as in the district under consideration. In many quarries throughout the Valley the stripped rock surface is very rugged, consisting of knobs or spires of rock with irregular cavities or cracks between them. Solution has not only honeycombed the surface, but it has followed joints or other planes of weakness, and thus has dissolved out seams or pockets many feet in depth. Masses of clay 30 to 60 ft. in width have been observed 80 ft. below the rock surface.

In general the clay pockets are very numerous at the surface, and are absent or greatly reduced in size at depth of 10 to 20 ft. Thus the bulk of the clay is usually found in the upper 6 to 12 ft. of the rock mass; in many quarries this upper zone contains as much clay as rock, or the clay content may exceed that of the rock.

Necessity for Separation of Clay

Clay is a hydrous silicate of aluminum, hence if clay is burned with the limestone, a lime contaminated with alumina and silica results. For certain uses a limited percentage of such impurities is permissible, but for most purposes a high degree of purity is demanded. It is apparent therefore that a clean separation is required, and owing to the large proportion and irregular occurrence of the clay such separation is surrounded by many difficulties.

General Methods of Removal

Two general methods are followed in removing the clay. The greater part of it may be stripped back before the ledge is blasted down, or clay and rock may be shot down together and separated later at the quarry floor. The first method is usually followed where a foot or more of solid clay lies above the highest points of rock. Where numerous knobs or ridges of rock are exposed at the surface, the difficulty of digging the clay from between the rock masses commonly results in the quarryman's following the second method—that of blasting down rock and clay together, and separating them while loading.

Merits of the Two Methods Considered

Where a large volume of clay occurs free enough from rock masses to permit the use of such mechanical equipment as the steam shovel or dragline scraper, it is undoubtedly wiser to remove as much as possible of the clay before blasting down the rock. If the rock surface is so extremely rugged that it is advisable to use hand tools only, the relative merits of the two methods are more difficult to judge. If rock and clay are shot down together, the intimate mixture makes separation slow and difficult. In rainy weather the clay adheres to the rock fragments, and the quarrying of clean rock becomes impossible. On the other hand, in cleaning out the pockets before blasting, the clay is fairly free of loose rock fragments, and the rock subsequently shot down is clean in either wet or dry weather. In loading dirt at the quarry floor, however, the laborer is required to lift it only high enough to clear the edge of the quarry car, in cleaning out pockets from the surface, clay must sometimes be raised 10 to 20 feet. Loading in the quarry is also much more rapid, as the clay is loose, whereas the firm, undisturbed clay in the pockets may require excessive use of the pick, or may even require blasting; thus its removal is slow and expensive.

High Cost of Hand Loading

Hand loading of clay is laborious, slow, and costly. This fact is recognized by most quarry operators, but ley the method is still widely used. The cost of loading owing to the peculiar conditions in the Shenandoah Valdirt at the quarry floor in 1922 varies from 15c to 25c per cu. yd. Hand loading of clay at the surface varies from 30c to 45c a yard. The latter figures applies to direct loading of clay from the bank to the car or dump cart. The cost may be very much higher where the clay is removed from deep cavities. At one quarry observed four men shovelled the same masses of clay to successively higher benches, and the fifth man loaded it into a dump cart. Under such conditions the cost might reach $1 or $1.50 per yard. Owing to the excessive cost of hand loading, and its wide employment in the Valley, the Bureau of Mines, though recognizing the difficulties to be overcome, urged upon operators the desirability of seeking more efficient methods. Improved methods now employed or proposed are discussed in the following paragraphs.

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[1] Reports of Investigations, Bureau of Mines, Department of the Interior.

Hydraulic Method

Hydraulicking is one of the most efficient methods yet devised for the removal of overburden. Water is pumped at high pressure, and is directed against the bank through a special nozzle. The method, however, is limited in application, as certain specific conditions must be met. First, there must be an adequate water supply. Second, the quarry must have proper drainage. The most favorable condition is where the natural drainage is back from the face, so that the soil may be washed away in some ravine, or other depression, where no further handling is required. In exceptional cases the soil may be carried toward the quarry face. In a quarry near St. Louis, Mo., hydraulic stripping has been successfully employed where the soil is carried across the quarry to the river by aqueduct. At a cement plant in Virginia the clay is washed to the quarry floor, where it is later loaded by steam shovel and removed in cars. It is unlikely that the hydraulic method can be employed profitably except in shelf quarries, where automatic drainage carries off the water used in stripping. A third condition to be met is the availability of a suitable settling basin, where the soil may be disposed without covering adjacent property or contaminating streams on which other industries depend.

The hydraulic method has been used with success in the Shenandoah Valley, the cost of soil removal being not more than 12½c per cu. yd. The Bureau has a record of a hydraulic stripping cost at a marble quarry in Tennessee, in 1916, of only 2c per cu. yd. In the gold districts of California, where, some years ago, hydraulic mining was widely used, the cost of handling gravel was about 2½c per cu. yd. As the actual gold value in much of the gravel did not exceed 3c to 5c per cu. yd., the cost of hydraulicking must have been kept considerably below this figure. At one of the large iron mines in Minnesota very extensive hydraulic stripping was conducted about 1914 at an average cost of 6.7c per cu. yd., including upkeep and office expense. In the Florida phosphate fields hydraulic stripping of fine overburden cost 5c to 8c per cu. yd. in 1912. In the Tennessee brown phosphate fields hydraulic stripping some years ago cost about 7c per cu. yd. At a Missiouri cement plant quarry visited by the writer in 1916 hydraulic stripping cost, including blasting of hard soil, was about 7c per cu. yd. Under 1922 operating sosts these figures should be increased approximately 50%.

Drag-Line Excavator

A drag-line excavator operated from a derrick arm has been used successfully in cleaning out clay pockets in Pennsylvania. The entire equipment is on a portable mounting, and the excavated material is loaded on cars just as when a steam shovel is employed. It cleans out shallow depressions fairly well, but some hand work is required in the deeper cavities. The lateral motion of the derrick arm gives the excavator a wide range and great flexibility of movement.

Drag-Line Scraper

The simple form of drag-line scraper may be used where a convenient dumping ground is available. Though some convenient devices for shifting the sheave attachment have been devised, in general this scraper lacks flexibility in lateral motion. Its use at limestone quarries has not yet been observed by the writer.

Clam-Shell Bucket

A clam-shell bucket operated from a derrick arm or crane has been used to a limited extent in moving soil overburden. Its usefulness in removing clay from erosion cavities is not yet established, and further information is desirable.

Tractor Excavator

A small tractor excavator widely used in road grading has been employed with success on eroded limestone surfaces in Pennsylvania. The dipper slides back and forth on an arm 12 or 14 ft. in length, which may be raised and swung aside for dumping into cars or wagons. The excavator is so equipped that the dipper may be lowered into a pit, loading as it is elevated toward the surface. Such an adaptation permits it to be used in cleaning out clay pockets.

Steam Shovel for Soil Only

Several operators in the Valley have used steam shovels with success on very uneven surfaces. Rock projections so interfere with continuous operation that great patience is required, and the operator must be prepared for much lost time both in loading and in moving. The shovel will not excavate from deep pockets, hence much hand work must follow, but where a depth of several feet of clay is encountered, the steam shovel is much more economical than hand loading. The smaller types of tractor, or caterpillar shovels, with dippers not more than ¾ yd. in size, are best adapted for such work.

The actual cost of steam shovel stripping varies greatly in different localities. In the Florida phosphate fields the contract price for steam shovel stripping was 20c per cu. yd. in 1912. At several cement plant quarries visited by the writer in 1916 and 1917 the cost of steam shovel stripping varied from 11c to 16c per cu. yd., including transportation to the dump. The Dolomite Products Co. of Cleveland, Ohio, in substituting a steam shovel for hand loading of soil overburden found that the daily cost of handling the same amount of material was reduced from $137.50 to $35 per day.

An interesting modification in the use of the steam shovel has been proposed, but has not yet been tried. It is suggested that rock and soil be blasted down together, the servicable stone sorted out and removed, and a steam shovel employed to clean up the soil and waste on the quarry floor. All good stone in the waste material could be thrown aside while loading. The adherence of mud to the rock during rainy weather, as previously mentioned is a disadvantage, but as waste is much more slowly loaded than good rock by hand methods, the proposed scheme has some merit.

Steam Shovel for Both Rock and Clay

A method now being tried in the Valley, and which, according to report, has been successfully used elsewhere, involves the use of the steam shovel for both rock and clay, in the upper part of the deposit. The great bulk of the clay in pockets and seams is usually confined to the upper 6 ft. to 12 ft. of the limestone deposit, thus if a cut 6 ft. to 12 ft. deep is made, the clay may be loaded into cars with a small tractor shovel having a ½-yd. dipper, and the rock masses drilled and blasted as they are encountered. The rock thus obtained may be loaded into separate cars, but it is not deemed advisable to do so, for it is difficult, if not impossible, to load clean rock with a steam shovel where rock and soil are mixed. As now conducted, the surface cut is at the margin of the quarry excavation, and all rock masses encountered are thrown over the edge, where they are loaded at the quarry floor. This makes possible a clean separation of rock and soil.

The method as thus briefly outlined is one of the most promising yet proposed, for it permits removal of almost the entire mass of clay with the steam shovel, and leaves the underlying limestone ledge relatively clean and well prepared for ordinary methods of quarrying.

Steam Shovel with Washing and Screening Plant

One operator plans to erect a washing plant, and in the writer's opinion this is the best solution of the stripping problem in large quarries. Small operators probably could not employ such equipment profitably, but where 250 tons or more of rock are quarried per day, there is no evident reason why a washing and screening equipment could not be employed with profit. Most operators will admit that with present high wages the steam shovel is far more efficient than hand methods for loading either rock or soil. The great weakness of the steam shovel is its inability to sort the materials that it loads, and hand methods are employed because it is necessary to sort the stone according to size, and to separate it from the clay. The washing and screening equipment accomplishes the necessary sizing and purification of the rock, and thus permits steam shovel loading. Where a heavy overburden is encountered, the bulk of the material may be stripped separately as a preliminary operation, but all clay that occurs in close association with the rock may be separated in the washing plant.

At one lime plant in Pennsylvania the rock is all loaded with steam shovels, passed through a jaw crusher with an 8-in. opening, and carried in a pan conveyor to a rotary screen. The larger sizes are conveyed to the kilns, and the smaller sizes to railroad cars for flux or road work. With the addition of nozzles and other necessary equipment, to wash the stone during its passage through the rotary screen, this type of plant would be ideal for rock mixed with clay as in the Valley region. It would also prepare the way for better utilization of the smaller sizes of stone, materials which are now mostly mixed with soil and thrown away as waste.

Removal of Clay from Deep Erosion Cavities

Occasionally clay-filled cavities of large size are encountered. In one quarry in Virginia a mass of clay 60 ft. across reached to the bottom of an 80-ft. excavation. On account of the slow hand methods employed, its removal seriously curtailed the output of the plant for two years. Obviously it would have been easy for a steam shovel, operating on the quarry floor, to remove such a mass in a few weeks.

Deep erosion cavities often occur in places where it is difficult or impossible to employ ordinary mechanical methods of removal. Several instances have been observed where a succession of laborers shovel the clay from bench to bench until it is finally thrown to a point from which it can be loaded into cars or dump carts. Such methods date back to antiquity, and involve a labor charge that is prohibitive under modern wage conditions. If a clam-shell bucket, dragline excavator, or similar device cannot be employed, it is suggested that the soil be mechanically elevated by means of some type of wagon-loading equipment now so generally used. A portable belt or bucket elevator is easily placed in position, and may be operated at low cost by electric motor or gasoline engine. With such simple equipment two men could easily do the work of six or seven.

Underground Methods

One operator has solved the stripping problem simply and effectively by removing the lower ledges of high grade limestones without disturbing the overlying inferior rock and clay. From the quarry wall an entry is driven into the ledge, and drifts are projected right and left. Certain disadvantages are connected with mining limestone, and the method is to be recommended only where a sound roof is obtainable, and where an excessive thickness of soil or waste rock overburden is encountered.

Summary

As a result of his observations, the writer concludes that the removal of the overburden is unusually difficult in limestone quarries in the Shenandoah Valley, and that stripping expense is consequently one of the chief items of quarry cost. It would be very helpful to the Bureau to obtain from operators who have the data definite figures showing the proportion stripping costs bear to total quarry cost.

The writer is convinced that if mechanical means of removing the overburden were more generally employed the stripping expense would be greatly reduced. Stripping costs in the Valley by hand methods vary from 20 to 45 cents per cu. yd. for average conditions, and are very much higher where clay removal is exceptionally difficult. The cost of hydraulic stripping varies from 3c to 11c per cu. yd., while steam shovel operation costs from 16c to 30c per cu. yd.

A decision as to the best methods and types of equipment to be used in stripping is open for discussion, and it is hoped that many operators will act upon the suggestion that they submit their ideas to the Bureau of Mines. —Reports of Investigations, U. S. Bureau of Mines.

Sun Portland Cement Company's Plant Under Construction

The Sun Portland Cement Co. has been organized and although it has not yet been incorporated, construction has already been started on a new plant, and it is confidently expected by those interested that finished cement can be turned out not later than next August. The company will shortly be incorporated under the laws of the State of Nevada. The capital stock proposed is $1,000,000 of which sufficient will be issued to those who have already subscribed enough money to build the plant.

Until the company is incorporated, officers cannot be elected, so at present, there is no certainty as to who will be in charge of the company's affairs. The names of H. A. Roth, Victoria, B. C.; L. C. Newlands, Oswego, Ore.; George MacDonald, Portland, Ore.; and H. L. Knappenberger of Rome, Idaho, are mentioned in connection with the project.

It is contemplated to build one 1000 bbl. unit. The raw and finish grinding machinery will be supplied by the F. L. Smidth Co., of New York and the kiln, which will be 9 and 10 ft. x 210 ft. long, by the Vulcan Iron Works, Wilkes-Barre, Pa. The site of the plant is near Home, Ore., on the Oregon Short Line Railway which parallels the Snake river, North.

Cement Stocks Increase—Production and Shipments Decrease

The statistics shown in the following table, prepared under the direction of G. F. Loughlin, of the United States Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The use of estimates was made necessary by the lack of returns from three producers.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN NOVEMBER, 1922, AND PRECEDING MONTHS

Month	Production (bbls.)		Shipments (bbls.)		Stocks at end of Month (bbls.)	
	1921	1922	1921	1922	1921	1922
Jan.	4,098,000	*a*4,291,000	2,539,000	*a*2,931,000	10,300,000	*a*13,316,000
Feb.	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	*a*14,142,000
Mar.	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	*a*13,848,000
1st quar.	15,240,000	15,254,000	12,091,000	13,218,000	....	....
Apr.	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	*a*14,470,000
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	*a*12,893,000
June	9,296,000	11,245,000	10,577,000	13,470,000	11,150,000	a10,718,000
2d quar.	27,228,000	31,664,000	27,984,000	34,811,000	....	....
July	9,568,000	11,557,000	10,301,000	13,850,000	10,414,000	*a* 8,433,000
Aug.	10,244,000	11,664,000	12,340,000	14,361,000	8,280,000	*a* 5,746,000
Sept.	10,027,000	11,424,000	11,329,000	12,444,000	6,953,000	*a* 4,724,000
3d quar.	29,839,000	34,645,000	33,970,000	40,655,000	....	....
Oct.	10,506,000	12,287,000	12,114,000	12,854,000	5,348,000	*a* 4,149,000
Nov.	8,921,000	11,349,000	5,195,000	10,167,000	9,091,000	5,331,000
Dec.	6,559,000	....	3,697,000	....	11,938,000	....
4th quar.	25,986,000	....	21,006,000	....	....	....
	98,293,000	....	95,051,000	....	....	....

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a Revised.

Stocks of clinker, or unground cement, at the mills at the end of November amounted to about 1,948,000 bbls., compared with 1,935,000 bbls. (revised) at the beginning of the month.

The Bureau of Foreign and Domsetic Commerce, of the Department of Commerce, reports that the exports of hydraulic cement in October were 80,402 bbls., valued at $227,092; of this total, 79,581 bbls., valued at $223,146 was portland cement, of which was sent to Cuba, 30,194 bbls.. to the other West Indies, 10,595 bbls.; to South America, 23,384 bbls.; to Mexico, 8,327 bbls.; Central America, 4,941 bbls.; Canada, 662 bbls.; and to other countries, 1,478 bbls. The total exports of hydraulic cement in 1921 were 1,181,014 bbls., valued at $4,276,986.

The statistics of imports of hydraulic cement from September 22 to November 30, and of exports of hydraulic cement in November are not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT BY MONTHS, IN 1921 AND 1922 *a*

Month	Imports (bbls.)		Exports (bbls.)	
	1921	1922	1921	1922
January	14,678	17,036	225,561	70,725
February	18,269	5,157	84,230	82,421
March	7,631	1,597	97,302	103,556
April	1,540	10,855	93,009	75,412
May	2,035	2,521	82,409	100,068
June	1,657	14,179	100,831	96,263
July	3,455	958	81,091	119,491
August	10,988	56,757	84,538	105,156
September	5,177	*b*42,641	84,668	78,615
October	11,448	*c*	79,871	80,402
November	20,112	*c*	71,214	*c*
December	25,327	....	96,290	....
	122,317	....	1,181,014	....

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a Compiled from records of the Bureau of Foreign and Domestic Commerce.

b Imported during period September 1-21, inclusive. Imports during period September 22-30 are not available.

c Imports in October and November, 1922, and exports in November, 1922, are not available.

Lime in New Brunswick

More lime has been shipped out of the port of Parrsboro in 1922 than for any year for ten years. Much improvement has been reported in the shipping, practically all of the lime being transported by schooner, United States ports being the destination of most of the shipments.

The end of the 1922 season has seen a remarkable and unexpected improvement in the lime situation in the maritime provinces. Until the first of August the situation was as gloomy as ever, but with the advent of August the lumber situation brightened perceptibly and the lime situation followed. The demand for lime was not as strong as it should have been during the past four years. The building outlook having improved, there was consequent improvement in the lime outlook.

St. John is the lime center of the maritime provinces, there being six concerns manufacturing lime in St. John and vicinity. The Stetson-Cutler Co., which has been reorganized lately and refinanced, has been operating the lime manufacturing plant connected with the Indiantown mill at St. John for practically the entire year. The kilns will be operated until the early part of December. This company has purchased new lime rock properties on Pokiok road, St. John. There is a report of the Stetson-Cutler Co. repairing the old kilns that have fallen into disrepair with disuse during the past five years, with a view to utilizing the old kilns again.

P. G. Mahoney, of Melrose, N. B., who died recently, was interested in lime burning in connection with his lumbering operations in Westmorland county and northern New Brunswick. Mr. Mahoney was financially interested in a lime burning plant at Port Elgin, N. B., which is near Melrose, and on Bay Verte, one of the little bays on the Northumberland Strait.

Clarke Brothers, Ltd., which concern operates lime plants at and near Bear River, which plants were idle for a short time during the adjustment of the financial difficulties of the company, has resumed operations in lime manufacturing. This company operates two sawmills, a paper mill and general store at Bear River, as well as the lime manufacturing plants. In addition, a small steamer is operated between Bear River and St. John, on the Bay of Fundy route.

The Fraser Companies, Ltd., have produced more lime during 1922 than for many years. The lime plant of this company at Plaster Rock, N. B., is believed to be one of the biggest lime plants in Canada. It is now working steadily at full capacity. Fraser Companies, Ltd., have extensive lime quarrying properties on which quarrying is proceeding, in and about Plaster Rock. The head office of the company is in Fredericton.

Claremont lime is being manufactured and sold by C. H. Peter's Sons, St. John. This firm bought the former Claremont House at Terryburn, seven miles east of St. John on the Canadian National Railways, and converted the hotel property into a lime plant. The quarries are adjacent to the kilns.

Randolph and Baker Co., operating a lime plant at Randolph, N. B., six miles from St. John, and on the St. John River, have been manufacturing and shipping considerable lime during the year. The lime plant has been operated steadily since April 1st. Most of the lime has been shipped directly from Randolph to the United States by schooner. This lime manufacturing plant at Randolph is one of the largest plants in the maritime provinces.

Accident Campaigns Reduce Accidents[1]

By A. C. Tagge

The most effective work toward prevention of accidents has undoubtedly been done in connection with the 29 accident campaigns conducted in the year 1922. The plants which have carried on these campaigns reduced their accidents 48.4%, their days lost 50% and their fatalities 100%, as compared with the same months last year.

"No Accident Month" campaigns were first tried during 1921. In order to show the continued effectiveness of the campaigns the following figures have been compiled showing the records for 30 plants for the years 1920, 1921 and the first ten months of 1922. During the last period practically as much cement has been manufactured as during the entire year, 1921.

	1920	1921	1922	Reductions
Accidents	1,393	1,108	726	48%
Days Lost	21,539	18,006	9,334	56%
Fatalities	31	19	17	45%

District safety meetings were held at St. Louis and Allentown. At these two meetings there was a combined attendance of more than 175 representatives from plants in the east, mid-west and south.

Two meetings of the Cement Section of the National Safety Council were held in connection with the National Safety Congress in Detroit, August 29 and 30, 1922. The attendance was made up largely of men directly connected with or responsible for the safety work at cement mills. The papers presented were interesting and valuable. We believe that it is well worth while for our member companies to give their full support to these meetings. We further believe that every member company would receive much benefit from being affiliated with the National Safety Council. The yearly dues are small compared with the service rendered.

Thirty-five plants are now carrying their own workmen's compensation insurance and reductions in insurance rates have been granted in many instances due to the better experience we are able to show. In this connection it is of interest that a representative from a liability insurance company at our meeting in Detroit made the statement on the floor that in years past cement plants were on their blacklist but now they are glad to take all such risks they can get.

It has been suggested that more interest in accident prevention work could be created if the Association would place in competition a trophy to be awarded yearly to the plant having the best record and to be retained by that plant for one year or as long as it is able to maintain the lead.

The committee is unanimously in favor of this suggestion and recommends that a suitable trophy be placed in competition for the year 1923 and presented to the winning plant at the Spring meeting in 1924. The committee further recommends that the Association as a part of the prize pays the expenses of two men chosen from the plant force as delegates to be presented with the trophy by the president of the association during the business session.

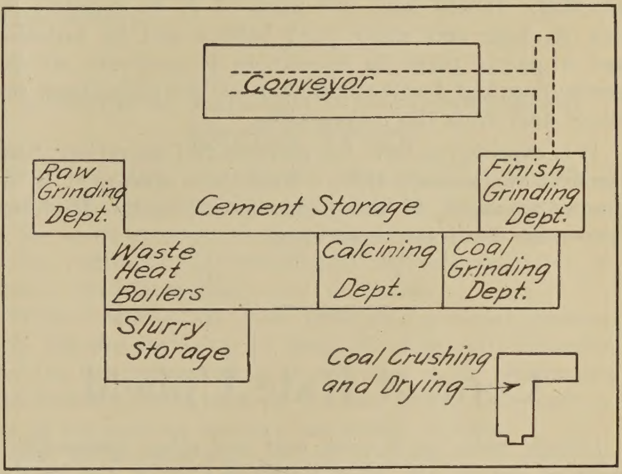
Ford to Manufacture Cement at River Rouge, Michigan

Plans have been completed and contractors' bids called for on the construction work for a wet process cement plant for the Ford Motor Co. at River Rouge, Mich. The plant will consist of a multiple story steel frame cement manufacturing building, with conveyor runs and open clinker storage adjoining.

The plant will be complete with one unite, and foundations for a second kiln and the necessary equipment for doubling the capacity are provided for.

The coal grinding and calcining department as shown in the accompanying sketch will occupy a site approximately 150x300 ft. A battery of 10 silo storage bins will be provided ultimately.

The equipment will include coal grinding mills, conveyors, slurry tanks and pump, compeb mills, rotary coolers and waste heat boiler installation in connection with the kiln.



General Layout of Ford Cement Plant

The clinker storage will have an 18 in. stocking conveyor with two reclaiming conveyors in tunnels.

The plant will be located near the River Rouge and in the vicinity of the Ford Motor Co.'s blast furnaces. It will adjoin the slag crushing building recently constructed, and will be accessible by railroad as well as by the water route.

Contract for the construction of the silo storage bins, pack house and bag house have been awarded to the MacDonald Engineering Co., Chicago, Ill.

Plans for the plant were made by Albert Kahn, Marquette Bldg., Detroit, Mich.

Cement makers of Alabama are pleased over the fact that railroad conditions are better than they have been for a number of months past. Since the walk-out of shopmen, July 1, there has been a shortage of cars in Alabama, and cement manufacturers have been unable to get a sufficient coal supply on this account. They have also been unable to get a sufficient number of cars in which to ship their products.

The shipping conditions are better now than they have been in a long time, but there is still room for much improvement, according to reports from the Birmingham district.

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[1] Abstracted from Report of Committee on Accident Prevention and Insurance, Portland Cement Association, presented at Annual Meeting Chicago, November 22, 1922.

Pittsburg Plate Glass Company Plans New Cement Plant

A new wet process cement plant is being planned by the Pittsburgh Plate Glass Co. and a force of engineers are at work in the Columbia Chemical Division, Limestone Products Department of the company at Zanesville, Ohio, working out the details and specifications for a 2500 barrel per day capacity plant.

This plant is to be operated in connection with the company's quarries so as to use up 600 to 700 tons of small weight limestone running from dust to 3/4 in. The stone is reported to be admirably adapted for the manufacture of portland cement and the company also has on its own property a shale deposit averaging 44 ft. of a fine quality, and coal is available within a mile of the plant. The plant will make use of the 600 to 700 tons per day of fine limestone screenings for which at present there is no market.

The plant is to be one of the most modern in the country and ample funds have been provided for its erection. It will have two kilns 11 ft. in diameter by 175 ft. long and waste heat boilers will be installed and a power plant in connection to generate all the power required for the operation of the plant from the waste heat from the rotary kilns.

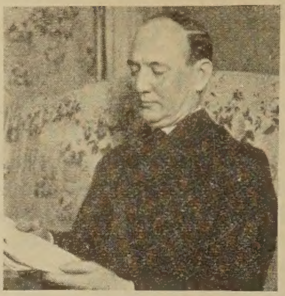
It is expected to have the plant in full operation about the first of January, 1924. Work is in charge of F. A. Jones, manager of the Columbia Chemical Division, Limestone Products department.

Cement Rate Upheld

Freight rates on cement, coal and other commodities assessed against the Atlas Portland Cement Co. by the Northampton & Bath R. R. and its trunk line connections on traffic from and to its mills at Navarro, Pa., were found unreasonable, except those on cement, by the Interstate Commerce Commission. The rates assailed by the Atlas company were increases resulting from the cancellation by trunk line carriers during April, 1914, of the joint rates previously in effect with the Northampton & Bath R. R. for a number of years. These joint rates were the same as the junction-point rates, and out of them the trunk lines had allowed divisions up to the N. & B. equaling that carrier's interchange switching charges. Cancellation of the joint rates increased the rates to and from points on the N. & B. by the amount of its interchange switching charges, namely, $2.50 per car, minimum 20,000 lbs., on carload traffic, and 1.25c per 100 lbs. on less than carload traffic.

The carriers justified the increased rates on cement, but not on other commodities, consisting largely of inbound coal, and these were found unjust and unreasonable to the extent that they exceeded those contemporaneously maintained on similar traffic to and from junctions with the Northampton & Bath. The Commission was not asked to prescribe divisions or to fix the amount of switching charges of the N. & B. which the trunk lines may absorb, and consequently no finding was made in that respect. The carriers are required to award reparation to the Atlas company after corrected statements are filed by the latter with the Commission.

F. W. Kelley Heads Portland Cement Association



F. W. Kelley, the newly elected president of the Portland Cement Association, is well fitted for the office, having served the association for several years past as treasurer and as chairman of the association's Committee on Technical Problems. Having been president of the Helderberg Cement Co., Albany, N. Y., since 1914, he has had wide experience in the cement field.

Mr. Kelley graduated in mechanical engineering from Cornell in 1893, and soon after was engaged in the experimental department of the Consolidated Car Heating Co., of Albany, later becoming general manager of the company.

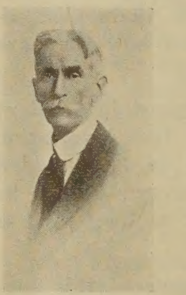
In 1900, when the Helderberg Cement Co. was changing its plant from a natural cement plant to one for the manufacture of portland cement, he was made its vice-president and general manager, starting his connection with the cement industry.

He is actively connected with the Albany Chamber of Commerce, Albany Medical College and Albany Hospital, as well as financial institutions in Albany.

Among the professional societies in which he has been active, are American Society of Mechanical Engineers, American Society of Testing Materials, American Institute of Electrical Engineers, Albany Society of Engineers and Society of Engineers of Eastern New York.

Mr. Kelley succeeds L. T. Sunderland, of Kansas City, as president of the association, and takes charge in the twenty-first year of its existence as an organization to improve and extend the uses of concrete. Eighty-six cement manufacturers, representing every section of the country, as well as Canada, Cuba, Mexico and South America, are members of the association and subscribe to its public service.

The Late S. B. Newberry

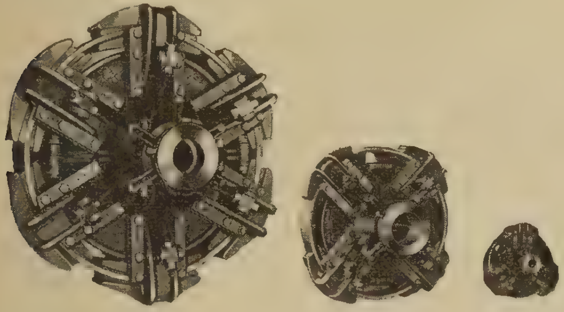


Dr. Spencer Baird Newberry, head of the Sandusky Cement Co., whose sudden death on November 28, 1922, was announced in the December issue of Concrete, was born in 1857. In 1878 he graduated from Columbia College, and spent the following two years studying in France and Germany. For a number of years following his graduation from Cornell he was professor of chemistry in that institution. In 1892 he founded the Sandusky Cement Co., with a mill at Bay Bridge, Ohio, serving for a number of years as general manager. He was later elected president, which position he held until his death. Under his management the business expanded, both in volume and in roduction units, the original Bay Bridge plant being supplemented by others at York, Pa., Toledo, Ohio, Syracuse, Ind., and Dixon, Ill. He was very instrumental in making white cement practical from a commercial standpoint, and his firm was one of the earliest producers of waterproofed cements.

The Hill Friction Clutch

The latest design of the Hill friction clutch, known as the Smith type, is announced by the Hill Clutch Co., Cleveland, Ohio. The principle of action of the new type remains the same as in the original Hill clutch, which is to grip a ring between vise-like jaws in pairs.

This clutch is designed to give positive movement of the jaws, both in engaging and disengaging, this being effected by means of a powerful and continuous toggle connection from cone to jaws. Another improvement in design permits any working part, including the inside jaws to be removed parallel to the shaft, and from the mechanism side. This can be done without disturbing the main hub casting pulley, or friction ring. It has the important feature of ebing self-centering and friction clutch cut-off couplings of this design do not require any alignment bushings to maintain a shaft alignment when clutch is disengaged.



Hill Friction Clutch

These friction clutches are furnished in either solid or split construction, in diameters from 12 in. to 84 in., having a capacity varying from 9 h. p. to 1,300 h. p. at 100 r. p. m.

Self-Fitting Key

In the new Keytite self-fitting keys, designed to eliminate the required hand fitting by an experienced mechanic, a tough chisel stock is used and this is ground to a size very slightly larger than the nominal keyway width. A cutting edge and chip recess are provided near the front end of the key. Ahead of these is a pilot slightly smaller than the nominal keyway width.

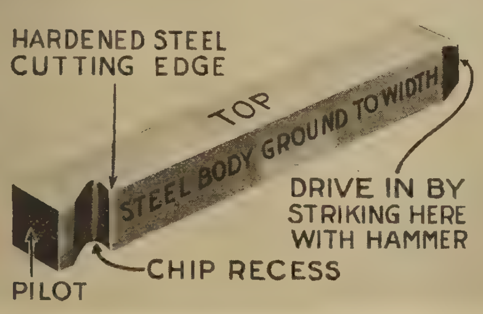

HARDENED STEEL CUTTING EDGE
TOP
STEEL BODY GROUND TO WIDTH
DRIVE IN BY STRIKING HERE WITH HAMMER
CHIP RECESS
PILOT

Fig. 1.—Keytite Self-fitting Key

To install one of these keys the pilot is entered first with the cutting edge at the side. Then the key is driven home with an ordinary machinist's hammer or with a sledge, depending upon the size of the key. The cutting edge sizes the keyways to make a tight fit between the body of the key and the keyways.

In the larger sizes cutting edges are sometimes provided on both sides. When it is desired to fit top and bottom as well as on the sides, a cutting edge is also provided at the top. Gib keys and other modifications can be furnished as required, all with this self-fitting advantage which saves the cost of hand fitting and which always provides that the key will be a tight fit in the keyways.

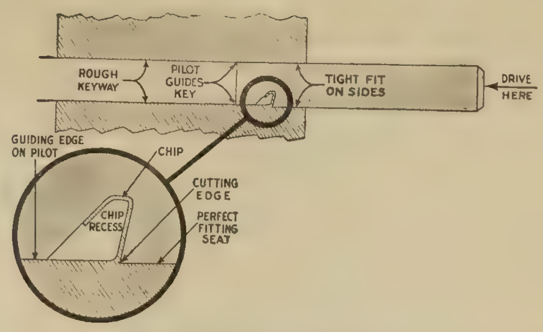


Fig. 2.—Diagram Showing How Cutting Edge Fits Key In Keyway

Chemical Equipment Association Begins Work

The Chemical Equipment Association, comprising manufacturers of equipment essential to manufacture in the score or more of chemically controlled industries of the continent, has established national executive offices at 1328 Broadway, New York City.

It has begun active work through a national membership for the fostering of trade in chemical equipment, and for the improvement of practices in the production and distribution of such equipment, and in the performing of engineering services incidental thereto.

The Association has already established communication with nearly two hundred of the large industrial associations of the country announcing itself as a source of information in chemical equipment supply matters, and has begun a regular bulletin service to members. The Association is, further, arranging details of a permanent cooperation with the Department of Commerce in the collection and dissemination of vital trade information.

Meade's "Portland Cement" Translated into Italian

The book, "Portland Cement," by Richard K. Meade, has been translated into Italian by Federici Federico, Director of the Delmatia Portland Cement Works, of Trieste, and is to be published by Ulrico Hoepli, of Milan, one of the most important publishers of scientific books in Italy.

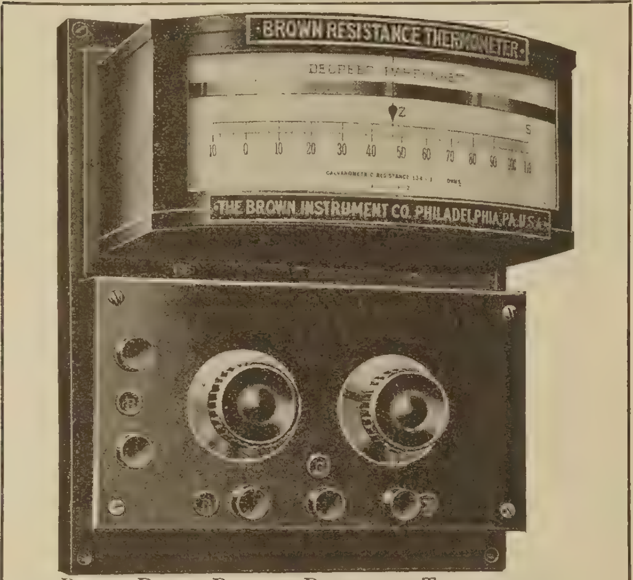
In view of the number of other books published in both English and German, dealing with the manufacture of portland cement, the selection of Mr. Meade's book for translation into Italian is not only a compliment to the author, but also to the American cement industry.

Mr. Federico has used the book, "Portland Cement," by Meade, for a number of years, in his work as a reference book on the manufacture, testing and analysis of portland cement, and had translated large portions of it for his assistants. This translation will make the complete book available for other Italian chemists.

A Direct Reading Resistance Thermometer

A new direct reading resistance thermometer which is claimed to be particularly advantageous for very accurately measuring temperature is the product of the Brown Instrument Co., Philadelphia, Pa.

To resistance thermometers are attributed certain notable advantages as compared with other temperature measuring devices which make them particularly valuable for many industrial processes. One particular advantage is in the ability to produce a high temperature instrument in which the whole temperature scale may cover a range of 25° F. only.


BROWN RESISTANCE THERMOMETER
10 0 10 20 30 40 50 60 70 80 90 100 110
THE BROWN INSTRUMENT CO. PHILADELPHIA, PA. U.S.A.

Brown Direct Reading Resistance Thermometer

The fundamental principle of the resistance thermometer is the well known physical property of metals, except special resistance alloys, of change in resistance with change in temperature. This change in resistance can be accurately measured and a scale calibrated in temperature degrees.

The bulb or coil of wire which changes in resistance is usually of nickel for temperatures to 300° F. (150°C.) and of platinum for higher temperatures to 1800° F. (1000° C.). The dimensions of the bulb can be very small to secure sensitivity. A nickel wire bulb can be supplied with active part 1″ long and 3/16″ diameter. This can be supplied in a protecting tube for moderate temperatures with an outside diameter of only ¼″.

Three wires lead from the bulb to the instrument. This three wire system eliminates any effect on the indications of the instrument due to changes in temperature along the wiring connecting the bulb to the instrument. The length of wiring is immaterial in the Brown three wire system and bulbs can be placed up to 1000′ distance from the instrument using No. 14 gauge copper wire or up to 2500′ distance (half a mile) with No. 10 gauge copper wire.

Applications where the Brown direct reading resistance thermometer can be used to advantage are in power plants for many temperature measurements, for the temperture of coal piles to prevent spontaneous combustion, oil cracking stills where extremely accurate measurements of temperature are required, chemical processes, refrigerating rooms, public buildings and schools, for the approach of frazile or anchor ice temperatures in hydro-electric power plants and numerous other applications.

New Books

Cements, Limes and Plasters—By Edwin C. Eckel, 2nd Edition. Size, 6 in. by 9 in.; 654 pp., illustrated. Cloth, $6.50 net. John Wiley & Sons, Inc.

This book deals with all classes of cementing material used by the engineer for structural purposes, including portland cement, natural cements, slag cements, limes, gypsum, plasters, etc. In preparing the second edition the original work has been extremely revised, statistics and reference lists have been brought up to date, and considerable new matter added on the production and utilization of gypsum, on cost, prices and production of portland cement and Canadian and foreign developments. An important feature is also introduced in the discussion of the economic and industrial features of each of the industries covered, including costs, prices, organization, etc.

Trade Publications

Jones Spur Gear Speed Reducer Catalog No. 26—By W. A. Jones Foundry & Machine Co., Chicago, Ill. This is an entirely new edition, containing information of exceptional value to consulting engineers, superintendents, chief engineers, master mechaics, or anyone who specifies mechanical drives for factories, mills, mines or plants.

In preparing this new and complete treatise on speed reduction drives, it has been the intention of the company to make it a standard work of its kind, containing technical and practical information, complete descriptive matter and illustrations of typical drives.

The installation section presents pictorially reducer drives in many large industrial plants. Dimensions, weights and horsepower ratings for complete speed reduction sets are shown.

Blasters' Hand Book, By E. D. duPont de Nemours & Co., Size 4 in. by 7 in.; illustrated.

This new and revised edition of the Blasters' Handbook, in attractive form, has just been issued. It was compiled under the direction of the manager of the company's technical section, and is especially valuable at this time to all users of explosives because it reviews blasting practice in every phase and gives the most approved methods of employing dynamite and black powder based on actual field use.

The book is profusely illustrated, showing proper methods of employing explosives under a great many different conditions. Instructions are given on firing; how to handle a misfire; how to use explosives in road and railroad building; side hill cuts; digging trenches; scrapping heavy machinery; blasting old foundations; and all kinds of quarry, mine and farm use. The subject of the use of explosives in agriculture is thoroughly discussed. How to handle and store them most efficiently is also pointed out.

The book is gotten up in compact, convenient, and permanent form, and is very well arranged.

Cement Prices Decrease

A list of present net prices on cement to the contractor in carload lots, f. o. b. cities named, not including package, issued December 29 by the Universal Portland Cement Co., shows a decrease of 14c per bbl. for cement in the city of Detroit.

A general decrease in price is noted for all cities named, ranging from 10c per bbl. for Cleveland, Ohio; Pittsburgh, Pa.; Duluth, Minn.; and St. Paul, Minn., to 15c per bbl. in Chicago, Ill.; Davenport, Ia.; Indianapolis, Ind.; Milwaukee, Wis.; and Toledo, Ohio.

The steamer Samuel Mitchel, flagship of the cement fleet, mde her last trip from Alpena, Mich., for the season on December 14, when she cleared the docks of the Huron cement plant with a cargo of cement for Detroit.

Men and Mills

Notes from the Field

At a hearing in regard to the Choctaw Portland Cement Co. on October 30, a schedule was filed by W. D. Ege, trustee, to sell certain personal property at the bond holders' petition for a review before the bankrupt court, which was allowed by the referee.

Since that date a petition was filed with the referee in bankruptcy by the trustee to sell all assets of the Choctaw company, free of liens, not covered in the trustee's petition for sale of personal property, and a hearing was scheduled before the referee at McAlester, for December 15.

The MacDonald Engineering Co., Chicago, is building a cement stock house and packing plant for the Alpha Portland Cement Co., at LaSalle, Ill., the stock house being a battery of silo storage bins. A somewhat similar building is also being constructed by the same company at the plant at Ironton, Ohio. Neither of these jobs have progressed much beyond the sub-foundation stage.

The same company is constructing a silo storage and packing plant for the Sandusky Cement Co., at its new Silica, Ohio, mill near Toledo.

A new cement plant, costing approximately $1,750,000 will be built by the Linwood Stone & Cement Co., on which its quarries and stone crushers are located. Linwood, where the company owns 184 acres of land

It is further stated that the proposed plant will have an output of not less than 2000 bbls. per day. Besides building the cement plant, the company also expects to enlarge its present crushers in order to enable it to crush stone for the manufacture of cement.

M. H. Hammond has been appointed general manager of operation and construction for the Indiana Portland Cement Co., at Limedale, Ind.

A new coal house which is under construction at the Indiana Portland Cement Co. is nearly completed.

The United States Portland Cement Co. with a plant at Concrete, Colo. has completed the erection of twenty five cottages for its employes; two concrete silos, 90 ft. in diameter by 45 ft. high, with a capacity of 20,000 tons of crushed rock. The installation of two 6 ft. tube mills and a No. 85 Kominuter in the finishing mill has also been completed.

In the spring it is expected construction work will start on a battery of ten silos having a capacity of 160,000 bbls. of finished cement.

A new 25 ton Vulcan steam locomotive has just been received at the plant of the Giant Portland Cement Co., at Egypt, Pa., and a new steam drier and hammer mill will be installed in the raw department this winter.

A 4,000 k. w., 25 cycle, A. C. turbo-generator unit will be installed in the plant of the Northwestern States Portland Cement Co. in about four months.

The Dewey Portland Cement Co. has recently installed one more Edge-Moor 1200 H. P. waste heat boiler, making three in all, and an Allis-Chalmers 3200 K. W. turbo-generator unit with Wheeler Engineering & Construction Co.'s surface condensor which, with the 3,000 k. w. General Electric unit, makes 6,200 k. w. These two units will replace 7 gas engines, as natural gas is nearly exhausted in the vicinity of Dewey, Okla.

The company is also erecting two 20 ft. dust collectors on the two original waste heat boiler stacks, and has ordered one Vulcan locomotive 13 in.x18 in. cylinder, capacity 32 tons.

The Cape Girardeau Portland Cement Co. has purchased the following equipment which will be installed in the near future; a Permutit water softening system with a capacity of 8000 gal. per hour; a motor-driven triplex boiler feed pump; a duplex steam service pump; stone storage bridge of 160 ft. span, giving storage capacity of 16,000 tons of stone. A garage building for the employes' use is also under construction.

The office of the Globe Portland Cement Co., which was opened in Dubuque, Ia., for a short time has been closed. The main office of the company is 416-18 McKnight Bldg., Minneapolis, Minn.

The Olympic Portland Cement Co. about November 15 resumed the burning of oil after using coal for a long period, finding oil to be the cheaper fuel at this time.

The management of both the Lehigh and the Northwestern States Portland Cement company plants at Mason City, Iowa, announced that conditions are such this year that the plants will be shut down only long enough this winter to permit necessary repairs. Two weeks, it is expected, will be required. Last year the plants were closed for more than two months.

Bonner Portland Cement company's plant closed December 10 until after the holidays. Some repairs will be made during the time the plant is closed. Shortage of coal is given as one of the reasons for the shutdown.

The Philadelphia Commercial Museum, Foreign Trade Bureau, 34th St., Philadelphia, Pa., has received an inquiry regarding a projected plant for manufacturing cement at Zawiercie, Poland, which is to be equipped with American machinery. The name of the organization interested in the proposed plant is:

Towarzystwo Akoyjne Przemystu Cemetowego "Wiek"
Skrzyka Pocztowa No. 3.
Zawiercie, Poland.

The plans and specifications for the plant for the South Dakota Cement Commission have been fully completed by the J. C. Buckbee & Co., engineers, and requests for bids have been forwarded to various concerns and bids are now in the commission's office covering practically all of the specifications.

It is the plan that a meeting of the State Cement Commission will be held at a comparatively early date at which time the bids will be opened and awards made. Immediately after the awards are made the commission hopes that actual construction may start and proceed as rapidly as possible.

On November 25, 1922, a postoffice was established at Speed, Indiana. All future mill correspondence and parcel post shipments for the Louisville Cement Co. should be addressed to Speed, Ind., instead of Sellersburg, Ind.

The Ingersoll-Rand Company and the A. S. Cameron Steam Pump Works announce the opening of a branch office at 718 Ellicott Square Building, Buffalo, N. Y.

This new office is equipped to render full service to those interested in air, gas and ammonia compressors, vacuum pumps, turbo-blowers and compressors, condensers, oil and gas engines, pneumatic tools, rock drills, centrifugal and direct-acting pumps and other of the numerous products manufactured by these companies.

Four kilns 7½x125 ft. have been moved from the Standard Mill at Napa Junction to the Santa Cruz plant of the Santa Cruz Portland Cement Co., which will make 18 kilns to be operated by that company this year.

A new clinker storage crane has been put into operation handling portland cement clinker at the plant of the Louisville Cement Co.

The Canada Cement Co., Ltd., recently decided to increase the capacity of its Lakefield, Ont., plant from a 2,000 to a 3,000 bbl. capacity per day, and the extensions are now being added to the buildings. The new work will include stock houses, and the necessary additional equipment. It is expected to have the building program completed about the end of next year.

A contract has been awarded to the MacDonald Engineering Co., of Chicago, designers and builders of concrete storage bins, for the design and construction of an entire system of grain elevators on the American plan for all of Bulgaria. The contract is between the MacDonald Engineering Co., and the Bank of Agriculture of Bulgaria, which is a Government institution organized for the financing and betterment of the agricultural interests. The total contract price is approximately $10,000,000.

The negotiations with the Bulgarian Government have been carried on by Mr. W. Theodore Rivett-Carnac, British associate of the MacDonald Engineering Co., and by Mr. Robert P. Durham, vice-president of the Company, of Chicago, who has spent much time in Bulgaria in the past two years making the necessary study of conditions.

Celite Products, Ltd., has been established in Canada to market Sil-O-Cel and Filter-Cel as produced by the Celite company in the United States. Sil-O-Cel is widely used for the prevention of excessive heat loss from boilers, furnaces, etc., as a high efficiency high temperature insulation. It is furnished in brick, block, powder, and cement forms, and may be applied to all types of heated equipment without change in design. Filter-Cel is used as an aid in filtering to secure greater clarity and brilliance of filtrate. Its use, according to the manufacturers, reduces operating costs by increasing the rate of flow and by enabling the filters to operate in longer cycles. Stocks of these materials will be maintained in Montreal. Lawrence Russel has been appointed manager, with offices in the New Birks Bldg.

The day of the dust nuisance at the plant of the Louisville Portland Cement Co. is nearing its close, for as a result of the study which Thomas McDonald has put on the problem, the company has purchased some new dust collectors, according to the *Speedometer*.

The largest installation will be the collector to take care of the dust which comes from the flue of waste heat boiler No. 6. This collector will be erected on the side of the waste heat boiler, between the boiler and the old potash settling chamber. This collector is of the cyclone type, and will be 35 ft. high and 20 ft. in diameter.

A new dust collector of the cyclone type has also been purchased to take care of the two rock dryers. This collector will stand on the dryer room roof and will be the mate to the collector now in operation in connection with the two shale dryers. The new collector will be 18 ft. high and 9 ft. in diameter.

For the coal plant an air separator and a cyclone collector have also been purchased. These collectors will collect the coal dust from the coal dryer, the Fuller Mills and the tube mills, and will greatly improve the working conditions in the coal plant. The air separator will be 8 ft. 4 in. in diameter and 14 ft. 9 in. high, while the collector will be 9 ft. 9 in. in diameter and 18 ft. high.

Thus the dryer room, coal plant and kiln room dust has been provided for. Plans are also being made for dust collectors in the raw room and in the bag house.

The cement plant of the National Cement Co. at Ragland, Ala., is being operated day and night, and is producing 70,000 to 90,000 bbls. of cement monthly. This plant is using 150 tons of coal daily, and is using all of the coal mined in the various mines in the vicinity of the plant.

The freight rate on quarry-run limestone from Lewisburg, Ohio, to Cement City, Mich., complained against by the Peninsular Portland Cement Co., has been found not unreasonable by the Interstate Commerce Commission. Under the commission's reduced rate order the rate of $1.26 per ton via the Cincinnati Northern R. R. has been reduced to $1.13. The $1.26 rate was not unreasonable in the past, the Commission stated, nor will the $1.13 rate be unreasonable in the future.

John Price, who has been active in the cement industry for many years, has entered the service of the American Oil Corporation, Jackson, Mich., in the capacity of sales engineer, specializing in cement mill lubrication.

For sixteen years Mr. Price served the Peninsular Portland Cement Co., of Cement City, Mich., the first six years having charge of the power house and the latter ten in the capacity of general superintendent. He was also general superintendent of the Rockwood Silica Co., Rockwood Mich., from 1916 to 1919, and left that company to enter the employ of the Northwestern States Portland Cement Co., Mason City, Iowa, where he had charge of the installation of a waste heat plant.

Mr. Price brings to the American Oil Corporation valuable experience in his special department, as he is thoroughly familiar with the cement industry, and the lubrication problems which daily confront it.

Friday, November 3, was the record day for cement shipments over the L. & N. E. R. R., from Bath, Pa. The local yardmaster reported that 252 cars were loaded and sent on the way to their destination.

The sixth annual convention of the National Crushed Stone Association will be held at the La Salle Hotel, Chicago, Ill., on January 15, 16 and 17, 1923.

The greatest shipping and one of the largest production years in the history of the Olympic Portland Cement Co. is reported for 1922 by its officials. Business has been so good that comparatively little cement was on hand when the plant closed for the holidays, hence the factory will resume operation after about three weeks' closedown, which is necessary for repairs. This year the company produced 450,000 bbls. of cement and shipped 500,000 bbls. or more, the year's trade cleaning up last year's surplus.

Most of the year's shipments have been sent to Washington points, and have been used chiefly in road building. Several thousand barrels also were shipped to Hawaii. The company believes that next year's business will be equally as heavy, if not heavier, and it hopes to operate throughout the year.

The unusually mild and open weather of the present season permitted a splendid run at the plant of the Peerless Portland Cement Co. at Union City, and it was confidently expected that manufacturing operations would continue all through December and possibly into January.

The Wolverine portland cement plant of Quincy has been closed for several weeks. Shortage of coal and a falling off of demand for cement were instrumental in closing the plant earlier than usual. At the present time, however, there are about five men working on the installation of a new 1,500 h. p. engine. After the first of the year a larger force of men will be employed in repairing and overhauling the equipment.

The Wolverine portland cement plant of Coldwater closed Tuesday, December 12, after a very successful season's run. The plant was closed down about a month in July and August, on account of a shortage of coal, but the balance of the year has had a steady run. After the first of the year a force of men will start overhauling the plant, getting it in readiness to open about March 15, 1923.

The Indiana Portland Cement Co. expects to operate its plant all of the present winter. Some few departments of the plant will close down a short time for repairs, but the plant as a whole will continue operations throughout the winter months.

The Public Service Commission on December 21, 1922, handed down an order authorizing a rate of 17½c per hundred pounds on cement shipments from Webak, eastern Oregon, to Portland over the O.-W. R. R. & N. lines. The carload minimum was fixed at 80,000 lbs. The new rate does not affect intermediate points.

Three weeks previous the Public Service Commission took testimony on the railway's application to establish this low rate on cement which will be produced by the Sun Portland Cement Co., on the Oregon side of the Snake river, about 15 miles from Huntington. Numerous shareholders of the Oregon Portland Cement Co., whose plant is successfully operating at Oswego, are active in organizing the new company to provide a larger supply of this construction material for the local market.

The annual meeting of the Lehigh Portland Cement Co. will be held in Allentown, January 17.

William Hicks, formerly superintendent of the Alpha Portland Cement Co.'s plant at Hudson, N. Y., has been made construction engineer for the Alpha company and is now in charge of construction work on improvements at the No. 4 plant at Martin's Creek.

The Tidewater Portland Cement Co.'s committee on Safety First reported but one lost-time accident for the month of November. This accident occurred while one employee was on his way to work. He slipped and fell, which caused him to break the small bone in his leg.

The raw material mill extension under construction at the Duluth plant of the Universal Portland Cement Co. will be 18 ft. by 100 ft., and will cost $16,000, with addition to machinery valued at $74,000. The construction cost includes the foundation, estimated at $4,500. The burner building is to be 48 ft. by 247ft., costing $90,500. It will house machinery worth $66,500. An expenditure of $233,000 is involved in the installation of an elaborate dust collector system, subdivided as follows: Foundation, $4,000; structure, $168,000; machinery, $61,000.

Additional equipment to the coal grinding building will involve an expenditure of $22,000.

Alterations to the interior of the finishing building will amount to to $6,000, with $24,000 to be expended for equipment. Altogether, foundation costs will aggregate $35,000, construction work proper $249,500, machinery $247,500.

With the new gas well recently completed near the plant of the Oklahoma Portland Cement Co., at Ada, the company will be supplied with 12,000,000 cu. ft. of gas daily, and company officials are of the opinion that that amount will be required.

Charles Boettcher, president of the Cement Securities Co., who recently returned to Denver from an inspection of the company's numerous plants, stated that it would be necessary for the Cement Securities Co. to open a sales office in Kansas City, Mo., a city that is now the headquarters of so many contracting firms that are doing road work in Southern states.

Eight storage bins are being built at the Whitehall Portland Cement Co.'s mill at Cementon for the storage of cement. The bins are to be about 63 ft. high and 30 ft. in diameter, and each will furnish storage for about 30 carloads of cement. They are being built by the Turner Construction Co., New York.

Alpha Purchases Continental

Arrangements have been completed for the purchase of the Continental Portland Cement Co.'s plant at Continental, Mo., by the Alpha Portland Cement Co., for $1,000,000. The purchasing company will assume all debts of the Continental company, including bonded indebtedness, and the Continental company will go out of business.

PORTLAND CEMENT CHEMIST invites correspondence with view to engagement with manufacturer desiring to employ experienced and dependable chief chemist not at present engaged in the cement industry. Correspondence confidential. Address Box 1444, c/o CONCRETE, 1807 E. Grand Blvd., Detroit, Mich.

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